

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

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Applicant's or agent's file reference 5547AUS	FOR FURTHER ACTION See Form PCT/IPEA/416	
International application No. PCT/AU2004/001193	International filing date (day/month/year) 3 September 2004	Priority date (day/month/year) 4 September 2003
International Patent Classification (IPC) or national classification and IPC Int. Cl. A01G 3/00 (2006.01) A01G 3/08 (2006.01) A01G 23/095 (2006.01)		
Applicant AUST PACIFIC FOREST MANAGEMENT PTY LTD et al		

- This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 3 sheets, including this cover sheet.
- This report is also accompanied by ANNEXES, comprising:
 - ☒ (sent to the applicant and to the International Bureau) a total of 4 sheets, as follows:
 - ☐ sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
 - ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
 - ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or table related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).
- This report contains indications relating to the following items:

<input checked="" type="checkbox"/> Box No. I	Basis of the report
<input type="checkbox"/> Box No. II	Priority
<input type="checkbox"/> Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
<input type="checkbox"/> Box No. IV	Lack of unity of invention
<input checked="" type="checkbox"/> Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
<input type="checkbox"/> Box No. VI	Certain documents cited
<input type="checkbox"/> Box No. VII	Certain defects in the international application
<input type="checkbox"/> Box No. VIII	Certain observations on the international application

Date of submission of the demand 10 March 2005	Date of completion of this report 01 January 2006
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustalia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer COLIN FITZGIBBON Telephone No. (02) 6283 2226

Box No. I Basis of the report

With regard to the language, this report is based on:

☒ The international application in the language in which it was filed

☐ A translation of the international application into _____, which is the language of a translation furnished for the purposes of:

☐ international search (under Rules 12.3(a) and 23.1 (b))

☐ publication of the international application (under Rule 12.4(a))

☐ international preliminary examination (Rules 55.2(a) and/or 55.3(a))

2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

☐ the international application as originally filed/furnished

☒ the description:

pages 1 to 7 as originally filed/furnished

pages* received by this Authority on _____ with the letter of _____

pages* received by this Authority on _____ with the letter of _____

☒ the claims:

pages as originally filed/furnished

pages* as amended (together with any statement) under Article 19

pages* 8 to 11 received by this Authority on 1 December 2005 with the letter of 1 December 2005

pages* received by this Authority on _____ with the letter of _____

☒ the drawings:

pages 1/5 to 5/5 as originally filed/furnished

pages* received by this Authority on _____ with the letter of _____

pages* received by this Authority on _____ with the letter of _____

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages

☐ the claims, Nos.

☐ the drawings, sheets/figs

☐ the sequence listing (*specify*):

☐ any table(s) related to the sequence listing (*specify*):

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

☐ the description, pages

☐ the claims, Nos.

☐ the drawings, sheets/figs

☐ the sequence listing (*specify*):

☐ any table(s) related to the sequence listing (*specify*):

* If item 4 applies, some or all of those sheets may be marked "superseded."

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Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Statement

Novelty (N)	Claims 1 to 20	YES
	Claims	NO
Inventive step (IS)	Claims 1 to 20	YES
	Claims	NO
Industrial applicability (IA)	Claims 1 to 20	YES
	Claims	NO

Citations and explanations (Rule 70.7)

Claims 1 to 20 The invention of the amended claim is a tree pruning apparatus including an elongate supporting body locatable along the trunk of a tree to be pruned; a pruning assembly mounted on and drivable along the support body and comprising a plurality of pruning jaws movable from an open position and a closed position substantially encircling the trunk; a plurality of blade members mounted on the jaws and having cutting edges forming a substantially circumferential array when the jaws are in their closed position, the blade members having arcuate cutting edges and being arrayed in two or more axially displaced planes, whereby the cutting edges may overlap in plan; and actuator means associated with each blade member and individual sensor means associated with each actuator means and operable to dynamically maintain a selected clearance between the trunk and each cutting edge.

No individual citation or obvious combination of citations discloses the tree pruning apparatus having blade members having arcuate cutting edges and being arrayed in two or more axially displaced planes, whereby the cutting edges overlap in plan.

The closest art of AU 54497/01 A (Koster et al), WO 1992/014353 A1 (Moisio) and EP 0 407 322 B1 (Raffaello) discloses tree pruning apparatus, but not with blades having arcuate cutting edges arrayed in two or more axially displaced planes which overlap in plan, hence the invention is considered to be novel and involve an inventive step.

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CLAIMS

1. Tree pruning apparatus including:
an elongate supporting body locatable along the trunk of a tree to be pruned;
5 a pruning assembly mounted on and drivable along said supporting body and comprising a plurality of pruning jaws movable from an open position and a closed position substantially encircling the trunk;
a plurality of blade members mounted on said jaws and having cutting edges forming a substantially circumferential array when said jaws are in their closed
10 position, said blade members having arcuate cutting edges and being arrayed in two or more axially displaced planes, whereby said cutting edges may overlap in plan; and
actuator means associated with each said blade member; and
individual sensor means associated with each actuator means and
15 operable to dynamically maintain a selected clearance between the trunk and each said cutting edge.
2. Tree pruning apparatus according to Claim 1, wherein said elongate supporting body is mounted on a wheeled or tracked vehicle for locating the
20 body adjacent the tree trunk.
3. Tree pruning apparatus according to Claim 1, wherein said vehicle is selected from powered and hand operated vehicles.
- 25 4. Tree pruning apparatus according to any one of Claims 1 to 3, wherein said elongate supporting body mounts said pruning assembly for movement by means selected from a track or moving chain.
5. Tree pruning apparatus according to Claim 4, wherein said pruning
30 assembly is urged along the vertical track by means selected from a chain drive, ram or hydraulic, pneumatic or electric motor.

6. Tree pruning apparatus according to any one of Claims 1 to 5, wherein said jaws of the pruning assembly comprise a pair of jaws hinged together.

7. Tree pruning apparatus according to Claim 6, wherein one said jaw is mounted for movement on said elongate supporting body.

8. Tree pruning apparatus according to any one of Claims 1 to 5, wherein said jaws are each pivoted from a carrier portion engaging said elongate supporting body.

9. Tree pruning apparatus according to any one of the preceding Claims, wherein said jaws are operable by means selected from manual means, hydraulic actuation and pneumatic actuation.

10. Tree pruning apparatus according to any one of the preceding Claims, wherein said sensor means comprises a mechanical sensor arm associated with the actuator means for each blade member and adapted to move along the trunk ahead of said blade member.

11. Tree pruning apparatus according to any one of the preceding Claims, wherein said sensor means comprises electronic or optoelectronic distance sensing means associated with the actuator means for each blade member.

12. Tree pruning apparatus according to any one of the preceding Claims, wherein said actuator means are selected from electric, pneumatic or hydraulic actuators.

13. Tree pruning apparatus according to Claim 12, wherein said actuator means are pneumatic actuator assemblies comprising a pneumatic actuator working against a spring.

14. Tree pruning apparatus according to any one of the preceding Claims, wherein said pruning assembly is driven along said elongate body member in use at a linear blade edge velocity of from 1 to 2.5 m/sec.

5 15. Tree pruning apparatus according to Claim 13, wherein said pneumatic actuator and spring comprise a sensor/actuator assembly, wherein said blade member is urged toward the trunk against the bias of said spring by said pneumatic actuator which is continuously operable in response to a follower interacting with the tree trunk as said sensor.

10 16. Tree pruning apparatus according to any one of the preceding Claims, wherein said blade members have a cutting edge of chisel-edged form with a substantially sheer face toward the trunk in use and a bevel from the cutting edge to the thickness of the blade body.

15 17. Tree pruning apparatus according to Claim 16, wherein said sheer face is relieved along said cutting edge at a relief angle of up to 6°.

20 18. A tree pruning method including the steps of:
locating an elongate supporting body alongside the trunk of a tree to be pruned;

25 closing pruning jaws of a pruning assembly mounted on and drivable along said supporting body to substantially encircle the trunk, said jaws mounting a plurality of blade members having cutting edges forming a substantially circumferential array, said blade members having arcuate cutting edges and being arrayed in two or more axially displaced planes, whereby said cutting edges may overlap in plan, the blade members being associated with respective actuator means and individual sensor means associated with each actuator means and operable to dynamically maintain a selected clearance
30 between the trunk and each said cutting edge; and

driving said pruning assembly along said elongate supporting body to prune said tree.

19. Tree pruning apparatus including:

an elongate supporting body locatable alongside the trunk of a tree to be pruned;

5 a pruning assembly mounted on and drivable along said supporting body and comprising a plurality of pruning jaws movable from an open position and a closed position substantially encircling the trunk;

10 a plurality of blade members mounted on said jaws and having cutting edges in circumferentially overlapping relation when said jaws are in their closed position, said blade members having arcuate cutting edges and being arrayed in two or more axially displaced planes, whereby said cutting edges may overlap in plan;

actuator means associated with each said blade member; and

15 individual sensor means associated with each actuator means and operable to dynamically maintain a selected clearance between the trunk and each said cutting edge.

20. A tree pruning method including the steps of:

20 locating an elongate supporting body alongside the trunk of a tree to be pruned;

25 closing pruning jaws of a pruning assembly mounted on and drivable along said supporting body to substantially encircle the trunk, said jaws mounting a plurality of blade members having cutting edges in circumferentially overlapping relation, said blade members having arcuate cutting edges and being arrayed in two or more axially displaced planes, whereby said cutting edges may overlap in plan, actuator means associated with each said blade member, and individual sensor means associated with each actuator means and operable to dynamically maintain a selected clearance between the trunk and each said cutting edge; and

30 driving said pruning assembly along said elongate supporting body to prune said tree.